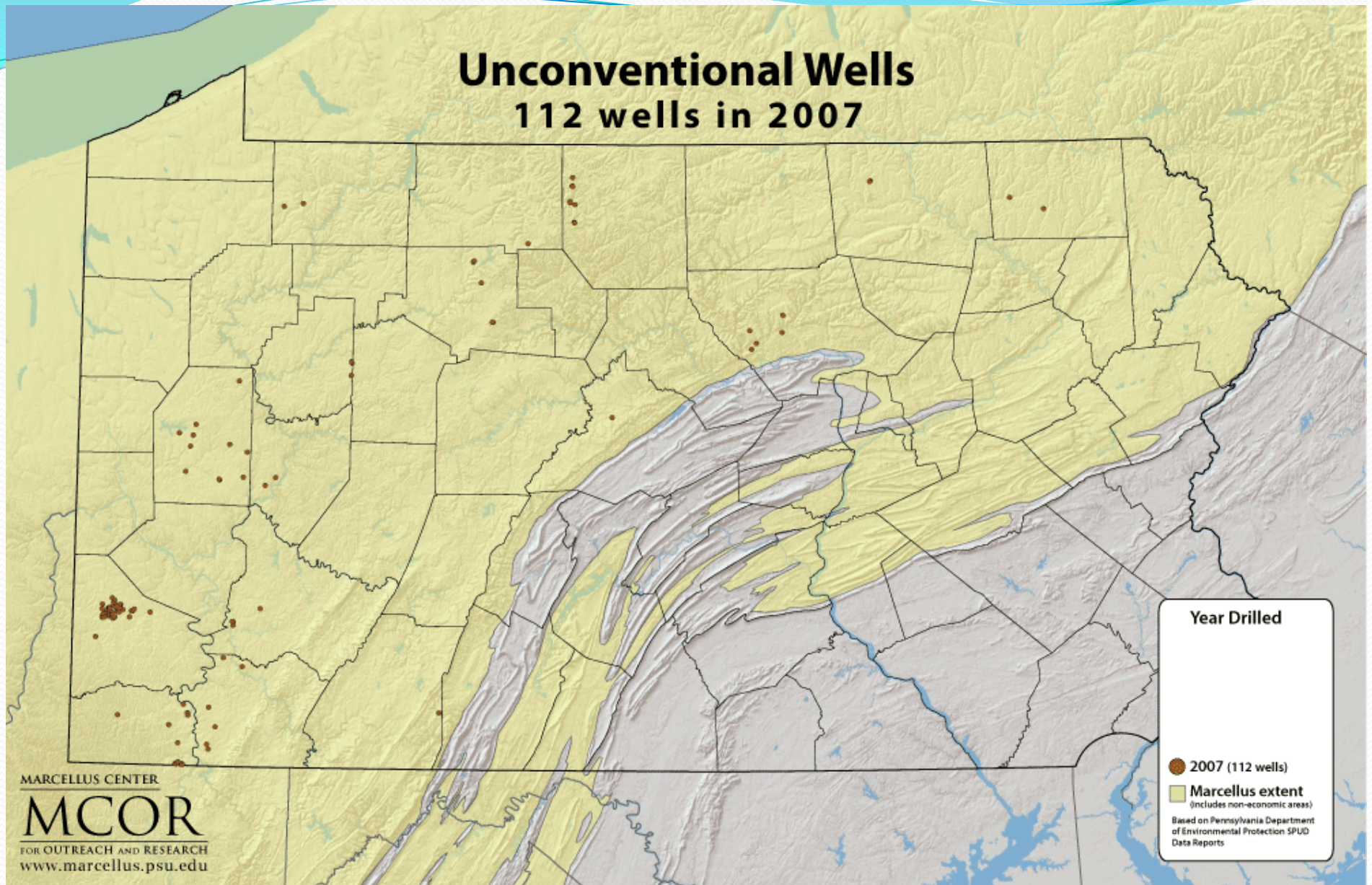


# Marcellus Shale in Northeastern PA

A Reporter's Experience

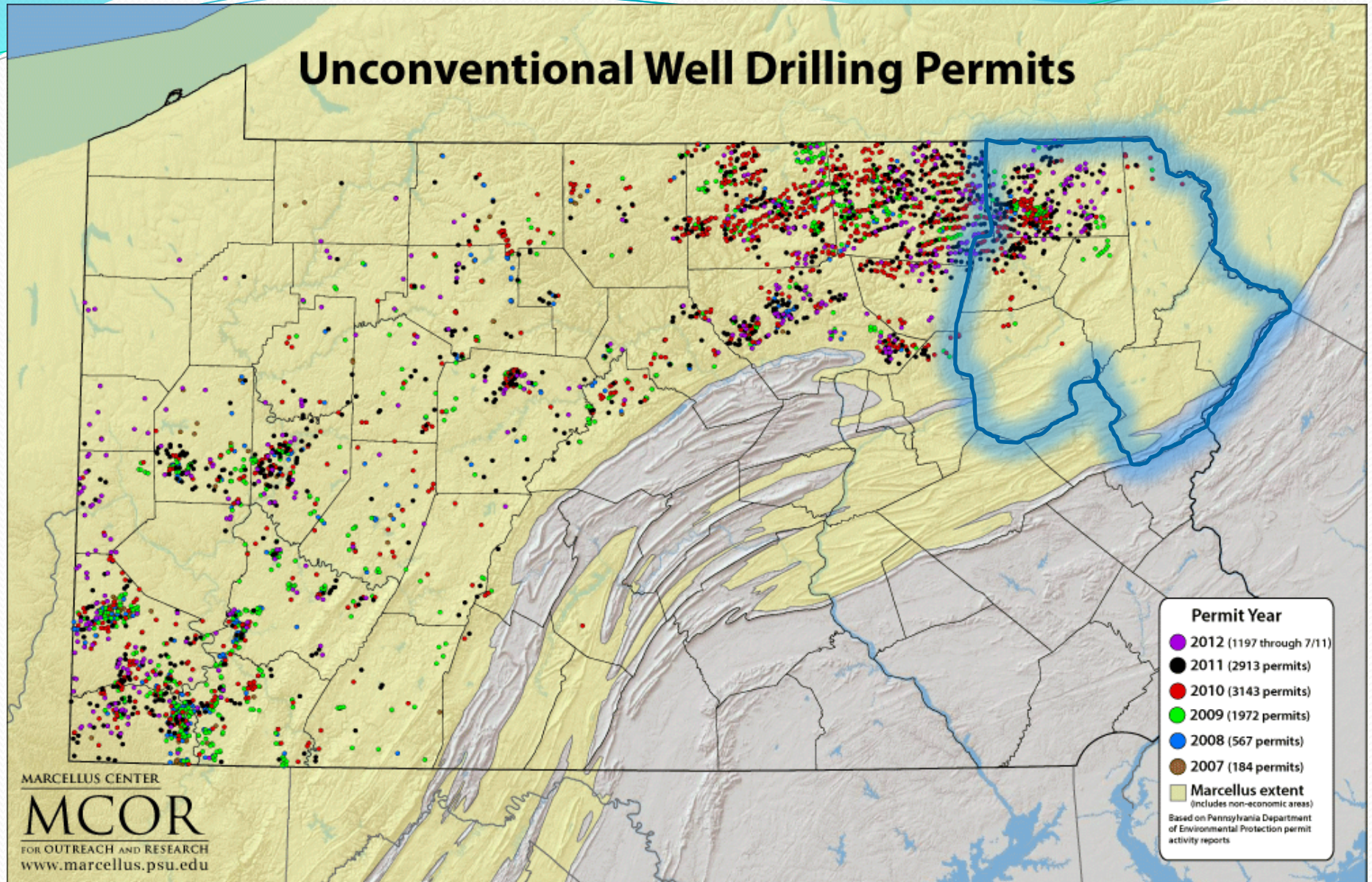
# Unconventional Wells

112 wells in 2007





# Unconventional Well Drilling Permits





# NEPA counties exemplify many of the benefits and costs of shale development

## Benefits

- Lease and royalty payments
- Employment
- Ancillary development (hotels, restaurants)
- Natural gas for manufacturing/transportation
- Lower consumer gas prices

## Costs

- Spills, methane migration, leaking pits
- Housing shortages, strain on social services
- Industrialization of rural landscape
- Community divisions
- Local air quality impacts





# They illustrate many of the “big picture” questions

- Who has the right to regulate the development?
- What are the economic implications?
- Is drilling/fracking damaging water supplies?
- Can the global climate benefits of gas be realized without affecting local air quality?



# But not all of them

- How much, if any, shale gas should be exported?
- Is natural gas a bridge to renewable energy or is it postponing a transition away from fossil fuels?
- What are the cumulative health, environmental and economic impacts of full development?

# The Times-Tribune

Began covering the Marcellus Shale in 2008

- “Marcellus Shale”: Feb. 1, 2008
- First series: May 4, 2008

Topics included the size of the resource, lease offers and deals, potential environmental and safety risks, comparisons to other gas boom regions, what to do with the wastewater

## DRILLING FOR DOLLARS

Natural gas reserves generate opportunity, uncertainty



A natural gas drilling rig tests shale beneath the Ordie Price's Sawmill property in South Gibson.

BY DAVID FALCHER, STAFF WRITER

**A**s Carl Penados lifts sheets of drywall onto the walls of a commercial property he purchased in Tunkhannock, he hears the low rumble of a passing truck.

A flatbed from the South carries a piece of equipment now familiar to those in the Endless Mountains — a section of a drilling rig.

The truck passes through the quaint downtown of antique shops and art galleries, and on its way out of town.

Its destination is a 4-acre, gravel-covered drilling pad in a cleared section of forest up a dirt access road. Once trekked upright, the drill will release natural gas locked tight in the rare famous Marcellus Shale.

The truck backs as the driver switches gears through the hilly region, passing overgreen pastures that belonged to dairy farmers forced to sell their animals, ironically, because of the high price of fuel and low price of milk. The truck passes another natural resource removed from the rolling hills and farmland: Pennsylvania bluestone.

The coveted, multi-colored sandstone quarried throughout the region. Agriculture, bluestone and timber have been unsavory pillars of the economy in the Endless Mountains. When land-poor farmers struggled,

the truck backs as the driver switches gears through the hilly region, passing overgreen pastures that belonged to dairy

Please see GAS, Page A14

## DEEP POCKETS

A four-day series on the natural gas drilling boom in Northwestern Pennsylvania

**TODAY:** A look at the natural gas drilling market in the region and who is regulating it.

**MONDAY:** Scores of companies are lining up to lease gas rights. But who are the companies, and what should lessees include?

**TUESDAY:** There are long-term and short-term environmental impacts from natural gas drilling that have some groups taking extra steps to preserve the landscape.

**WEDNESDAY:** Regions in Texas and Arkansas that are dealing with the impacts of natural gas drilling provide a glimpse of NEPA's possible future.



A worker tests shale in South Gibson. The rig's drill will release natural gas locked in the shale.



Who has the right to regulate oil and gas  
development?





# EPA rides into Dimock

## Feds to test 61 wells, provide water

BY LAURA LEGERE  
STAFF WRITER

The federal government will begin testing water supplies for 61 homes in Dimock Twp. as soon as today in a dramatic expansion of the Environmental Protection Agency's current investigation into potential contamination by natural gas drilling.

ing and hydraulic fracturing in the Susquehanna County township.

Citing its authority under the Superfund law, the EPA will also begin providing replacement drinking water supplies to four township homes where water tests taken by outside firms raised health concerns — some of

them rising to the level of an "imminent and substantial threat" in houses where small children live, the agency said.

The EPA reached out to both the state Department of Environmental Protection and Cabot Oil & Gas Corp., the Marcellus Shale driller active in the area, to ask if

they would be interested in working with the agency as it collects data.

Both agreed to cooperate Thursday, but indicated they were not convinced that the EPA's actions are necessary.

"Our review, so far, tells us that EPA does not seem to have presented any new data here," DEP spokeswoman Katherine Gresh said. "More than a year ago, DEP's enforcement action addressed

this issue and ensured funds were set aside to resolve the water quality issues for these homeowners."

Cabot spokesman George Stark said the company's tests show the Dimock well water meets

Please see  
**DIMOCK,**  
Page A6



### In the gas fields

- Township residents welcome feds. **A7**
- Ex-pipeline workers have hearing on deer poaching charges. **A7**
- Governor to sign law requiring an emergency response plan for every gas well in the state. **A7**

"The federal government will begin testing water supplies for 61 homes in Dimock Twp. as soon as today in a dramatic expansion of the Environmental Protection Agency's current investigation into potential contamination by natural gas drilling and hydraulic fracturing in the Susquehanna County township. Citing its authority under the Superfund law, the EPA will also begin providing replacement drinking water supplies to four township homes where water tests taken by outside firms raised health concerns — some of them rising to the level of an "imminent and substantial threat" in houses where small children live, the agency said.

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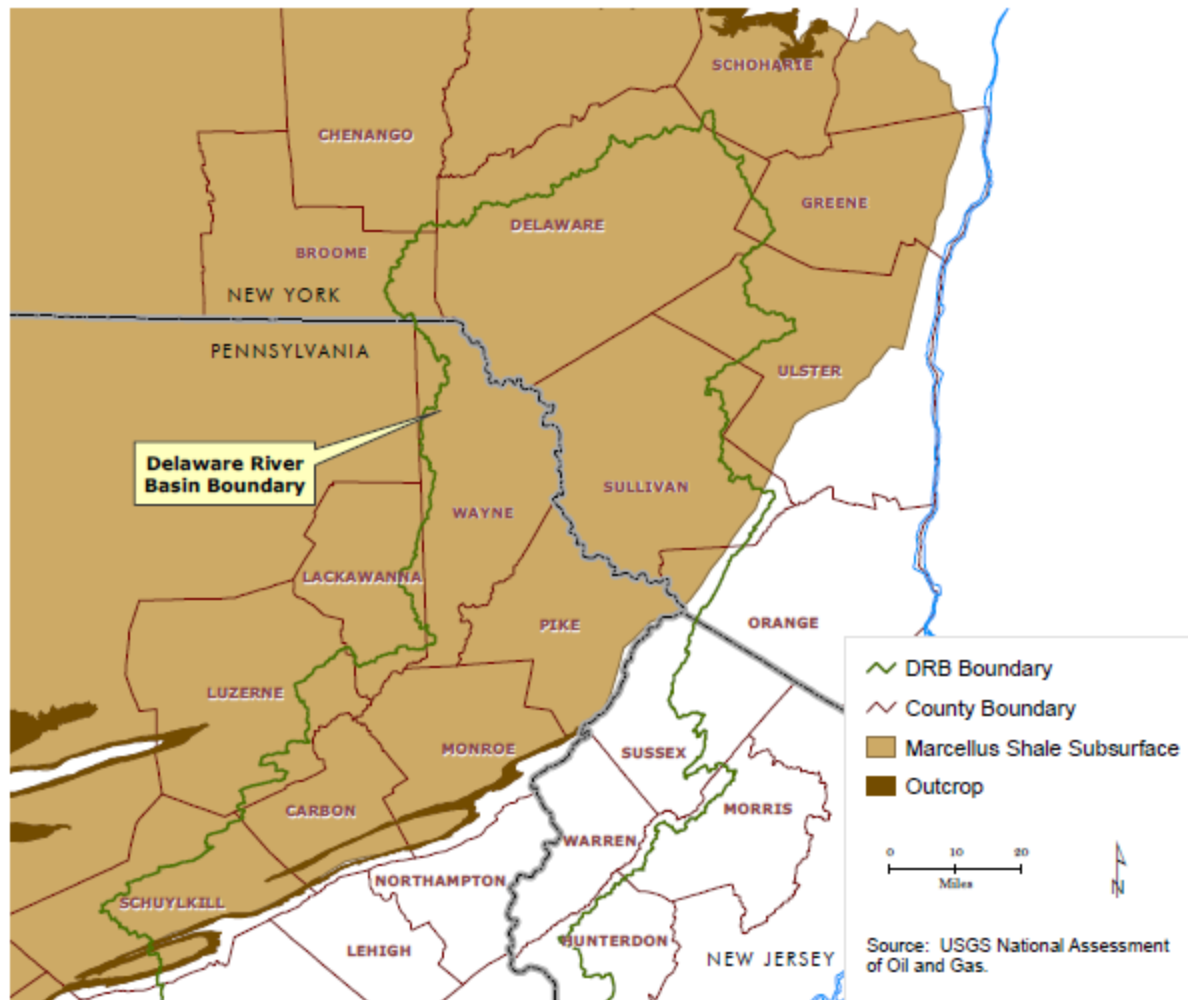
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...

Federal environmental regulators reopened their investigation of Dimock water wells in late December after declaring on Dec. 2 that the water posed no "immediate health threat." The agency reversed course after reviewing water test results released only after the agency's announcement.

The agency has been criticized by the state for having only a "rudimentary" understanding of the situation in Dimock and by the industry for overstepping its regulatory authority."

# Delaware River Basin



## State, feds divided on DRBC's gas-drilling plan

LAURA LEGERE

July 13, 2011

Written comments posted online by the Delaware River Basin Commission show federal and state officials sharply divided over the interstate agency's proposal to regulate gas drilling in the 13,000-square-mile watershed.

The comments from government agencies range from a push for far more oversight by the New York state attorney general's office to a recommendation by the Pennsylvania Department of Environmental Protection that the DRBC dramatically curtail its proposed rules.

The draft regulations, released in December, address where drillers get the water necessary for natural gas development, where well pads can be built in the watershed and how companies must dispose of wastewater.

# Act 13 zoning restrictions

Benton touting gas well monitor

LAURA LEGERE

January 2, 2012

As the state General Assembly considers legislation to curb local control of natural gas drilling, an experiment in local oversight of an exploratory Marcellus Shale well in Benton Twp. has been an “unequivocal” success, a supervisor said.

An independent engineer hired by Benton is monitoring the drilling and construction of a well by Southwestern Energy Production Co. that will evaluate the gas-bearing potential of the shale more than a mile below a field off Route 407.

The idea, Supervisor Larry Seymour said, is “monitoring as opposed to controlling” the operation. “The issue really is getting the desired outcomes and avoiding unanticipated negative consequences.”



July 28, 2012

Act 13, which was adopted in February, made gas drilling a permitted use in all zoning districts, including residential.

That uprooted a central aspect of Benton Twp.’s ordinance, which requires a gas operator to get conditional use approval before drilling a well.

The township attached several conditions to the one exploratory Marcellus Shale well drilled so far in Benton, including allowing an independent engineer on site to witness the process.

“A conditional use permit really isn’t much more than a conversation between the applicant and the community,” Supervisor Larry Seymour said. “As far as I’m concerned, when there’s an activity as dramatic as oil and gas development that is going to have community-wide ramifications, it calls for a conversation.”





What are the economic implications?



# Susquehanna County: Economics

The county has produced \$1.2 billion worth of gas from 330 wells through June 2012

- \$150 million in royalties to lease holders

State sales tax collections in the county increased 10 percent between 2007-10, compared to a statewide county level decrease of 3.8 percent

Susquehanna County current unemployment rate: 7.8%

2008-10: the county's average income decreased, its unemployment rose by 3.2 percentage points



# Wyoming County: Economics

- Wyoming County current unemployment rate: 9.3%
- 2008-10: Per-capita income increased 4.3 percent, due to a \$212 million natural gas lease deal in 2009 on about 37,000 acres of property



## P&G taps Marcellus for power

ROBERT L. BAKER

October 11, 2012

WASHINGTON TWP. — The Procter & Gamble plant in Wyoming County will be 100 percent energy self-sufficient by February by tapping into Marcellus Shale gas that lays beneath its property. The plant, which produces Pampers and Luvs diapers and Charmin toilet paper, now consumes 800 billion kilowatt hours, or enough energy to run 40,000 homes. It currently produces 50 percent of its electrical needs. Otherwise, for the last 45 years, it easily has been the largest electricity and natural gas customer for local utilities.

“But not after next February,” P&G spokesman Alex Fried said Wednesday afternoon. “This will be a first for any of Procter & Gamble’s 150 plants worldwide, and we’re pretty pleased it’s happening here in Wyoming County.”

The transformation did not happen overnight and it was not without its fits and starts. About eight years ago, Procter & Gamble was looking at being the lead customer in an 88-windmill farm that would use the Mehoopany plant’s power grid to send out half the generation it did not harness inside the plant.

But BP Wind Energy ran into some cash-flow issues during the recession and at the same time, Citrus Energy was exploring for gas on P&G’s property. It discovered wells on P&G and surrounding properties were among the most prolific in the Marcellus Shale.

Among its efforts toward self-sufficiency, on Wednesday, P&G showed off the only fast-fill CNG station in the region, which replaces more than 400,000 gallons of diesel.

The station is located at the Exel-operated P&G warehouse in Washington and Meshoppen townships, and presently serves as the energy source for 22 trucks that move product from the P&G plant to the warehouse 5 miles away.

The trucks will be filled two to three times during a 12-hour shift, P&G project manager Cale Newswanger said.

Mr. Newswanger said Exel has changed 52 of its forklifts from electric to CNG for better productivity.

Exel General Manager Ryan Calvert said the plant was the first of Exel’s more than 400 warehouses in the Americas to be sustained by energy harnessed locally.

The Dallas resident said, “It gives us a tremendous sense of pride to be on the cutting edge of the industry in an environment of sustainability.”

Mr. Fried noted that P&G had in the works to create another CNG station adjacent to its manufacturing plant, but had no interest in getting in the fueling business.

“That’s for someone else to tackle,” he said.



## UGI expects a rate cut

DAVID FALCHEK

May 18, 2012

Natural gas rates will remain the same for customers of UGI Penn Natural Gas for most of 2012 but are expected to fall just before the heating season.

UGI said it anticipated keeping natural gas rates unchanged for much of the year, but would reduce rates Dec. 1, sending the average gas bill down about 4.5 percent. For a household using about 8.9 thousand cubic feet, or Mcf, of natural gas per month, the bill will drop from \$94.50 to \$90.25 per month.

The component of the bill falling, the purchased gas cost rate, currently at \$5.22 per Mcf, is expected to fall 8.9 percent to \$4.75, the lowest in at least a decade. The expected rate is an estimate and may change.

Vicki O. Ebner, senior vice president of customer and government relations, credited the nation's shale gas reserves for the low wholesale price of the natural gas.

"An abundant supply of natural gas is allowing us to continue to pass these savings onto our customers," she said.

This is the latest rate drop for UGI, which is passing on much of the lower price of natural gas, driven down by a warm winter and abundant supplies. The typical UGI customer's bill is 40 percent lower than four years ago. While the rate declines for UGI customers have been welcome, UGI's rates remain among the highest in the state.



Is drilling/fracking damaging water supplies?



## Plagued by methane

### *Faulty drilling practices linked to stray gas*

LAURA LEGERE

Methane that caused a blast in a Dimock water well, forced a family to evacuate a Terry Twp. home and bubbled up in the Susquehanna River was unsettled from porous rock between the surface and the Marcellus Shale as drillers searched for deep gas.

In high-profile cases affecting 35 drinking-water wells in Bradford and Susquehanna counties, state investigators have linked the stray methane to faulty drilling practices that did not account for the gas-rich and highly fractured shallow geology in Northeast Pennsylvania — a hazard that has made the region one of the most difficult places in the state to drill safely into the Marcellus Shale.

As shale gas drilling has increased in Pennsylvania, so has the prevalence of methane migrating into water supplies as a result of the exploration.

The number of new Marcellus wells nearly doubled between 2009 and 2010, but the rate of methane migration more than quintupled: In 2009, there were 1.26 cases of gas migrating into groundwater for every 1,000 new Marcellus wells drilled, according to the Department of Environmental Protection. Last year, there were more than seven cases for every 1,000 new wells.

Of the 10 confirmed Marcellus Shale stray gas cases since the start of 2008 — each of which may include more than one affected water well or flawed gas well — all of them have been recorded in this corner of the state. Seven of the cases were in Bradford County and one each was in Wyoming, Susquehanna and Lycoming counties.



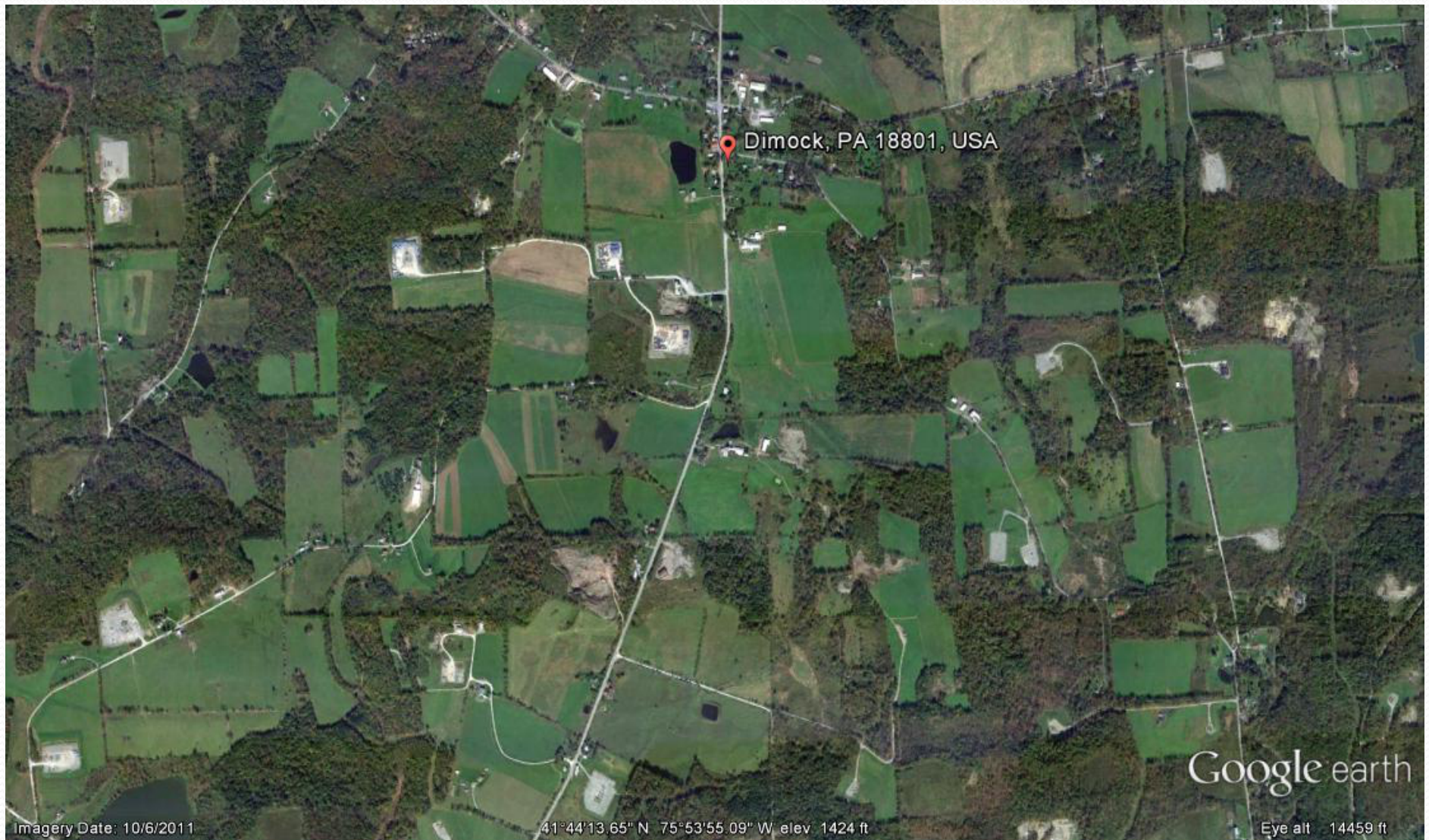


# Dimock 2005





# Dimock 2011







## Study: Drilling could hurt streams

LAURA LEGERE

October 13, 2010

A preliminary study of Susquehanna County watersheds has found that high-density Marcellus Shale gas drilling might degrade streams regardless of how carefully that drilling is done.

The tentative findings were released by researchers with the Academy of Natural Sciences in Philadelphia on Tuesday to demonstrate the need for studies of the long-term and cumulative impacts of deep-gas drilling on watersheds — an area largely devoid of research despite the rapid expansion of Marcellus Shale gas extraction in the state.

The preliminary study conducted this summer by academy researchers and a graduate student at the University of Pennsylvania looked at small watersheds in and around Dimock Twp., an epicenter of shale drilling in the region.

Scientists compared water quality and the presence of environmentally sensitive insects and salamanders in nine similar watersheds, three of which had no drilling, three some drilling and three a high density of drilling.

The watersheds with high-density drilling — defined as four to eight wells per square kilometer — had significant impacts on all measures compared to those with little or no drilling, the researchers found. Water conductivity — a measure of the dissolved salts and metals in the stream and a potential indicator of the presence of gas drilling wastewater — was almost twice as high in the streams in high-density areas than those in areas with little or no drilling.

In the high-density sites, the number of both sensitive insects and salamanders were reduced by 25 percent. The findings were first reported Tuesday by The Philadelphia Inquirer.

“The data suggest, on one hand, that you could have a certain level of drilling and be OK,” said Dr. David Velinsky, vice president of the Academy’s Patrick Center for Environmental Research. “But if you get to a watershed where you have tons of these well pads and the associated infrastructure, you’ll see some change in the ecosystem health.”



Can the global climate benefits of gas be realized without affecting local air quality?

# Air quality concerns raised as gas compressor stations multiply

By Laura Legere  
Staff Writer

The number of natural gas compressor stations planned for Northeastern Pennsylvania is multiplying as companies lay more pipelines to carry Marcellus Shale gas to customers.

The state has issued or is considering 29 air quality permits for separate stations in the northeast region, all of them in Susquehanna, Wyoming and Luzerne counties, according to a tally by the Department of Environmental Protection. Nearly two dozen of the permits are for stations planned within a 15-mile radius of the Susquehanna County seat in Montrose.

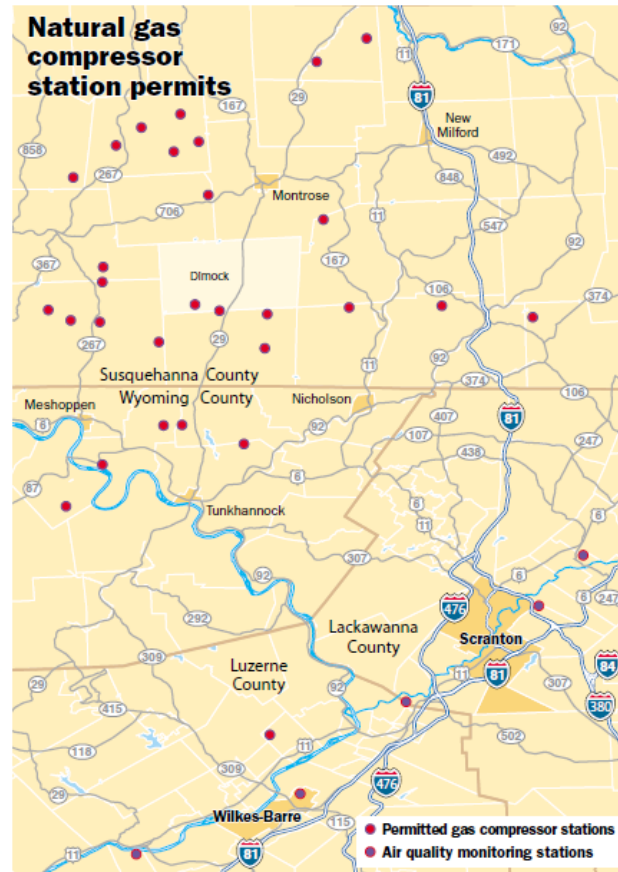
DEP has issued 383 of the permits statewide since October 2005, according to the agency's tally. Not all of the permitted stations have been built and some may never materialize.

The permits cover facilities related to gas production, including compressor stations and dehydration units that strip liquid from the gas and speed it up for transport through interstate pipelines.

Each station emits a mix of pollutants — volatile organic compounds (VOCs), nitrogen oxides (NOx), formaldehyde and greenhouse gasses — in varying amounts that are limited by the type of permit governing the site.

Residents concerned about the proliferating stations' impact on air quality have brought basic questions to public hearings in the region that are sometimes held as the state considers issuing permits: How many compressor stations will be built here? What is the combined impact of all these new pollution sources? When, if ever, can the state say stop?

The state considers the cumulative effect of the compressors using an existing network of monitoring stations that measure the ambient air quality, mostly in urban areas, Mark Wejksner, DEP's regional air quality program manager,



told an audience at a hearing this spring in Susquehanna County. The closest monitors are in Scranton and Wilkes-Barre, about 30 miles away.

Pollution levels above federal air quality standards measured at those stations would determine if the state issues fewer or stricter permits, he said, but "right now, we're in compliance with all of them with a lot of leeway."

Environmental groups have criticized the state in lawsuits, letters to federal regulators and in public comments on proposed permits and regulations arguing that

DEP is not doing all it can under the law to limit the amount of pollution the oil and gas facilities are allowed to emit.

They say that the state's current air quality monitoring network is inadequate to measure the impacts of gas drilling and infrastructure in rural areas far from the established monitors clustered in population centers and point out that it is too late now — years into the development of the gas-rich shale — to measure what the air was like before the wells, pipelines and compressors were built.

"DEP does not have a comprehensive monitoring program to monitor contaminants in the air throughout the shale play regions of the state," PennFuture president George Jugovic Jr. said. "We're not monitoring for VOCs in these rural areas. We're not monitoring for toxics. Having already begun this development, baseline is not really a question anymore. Now the question is can we get monitoring to ensure there are no local or regional impacts as we move forward."

SEE COMPRESSORS, PAGE 27

## State to monitor air quality in 2 counties

LAURA LEGERE

July 25, 2012

State environmental regulators plan to install a long-term air-monitoring device in Susquehanna and Wyoming counties to screen for impacts from natural gas operations in the region. The monitoring plan, which is still in its early stages, was inspired by public concerns raised at recent hearings for proposed natural gas compressor stations that move gas from the Marcellus Shale in the two counties, regional Department of Environmental Protection spokeswoman Colleen Connolly said. "We felt, given the number of compressor stations being put up in Susquehanna and Wyoming counties, they would be ideal locations," she said.

DEP will use a canister device to monitor primarily for volatile organic compounds beginning at the start of 2013, she said. The device will likely operate for a year in one county and then be moved to the second county for a year.

Regulators will be able to remove the device from a mount high in the air to collect results every two or three weeks, she said. The department has yet to secure locations and leases for the monitoring sites.

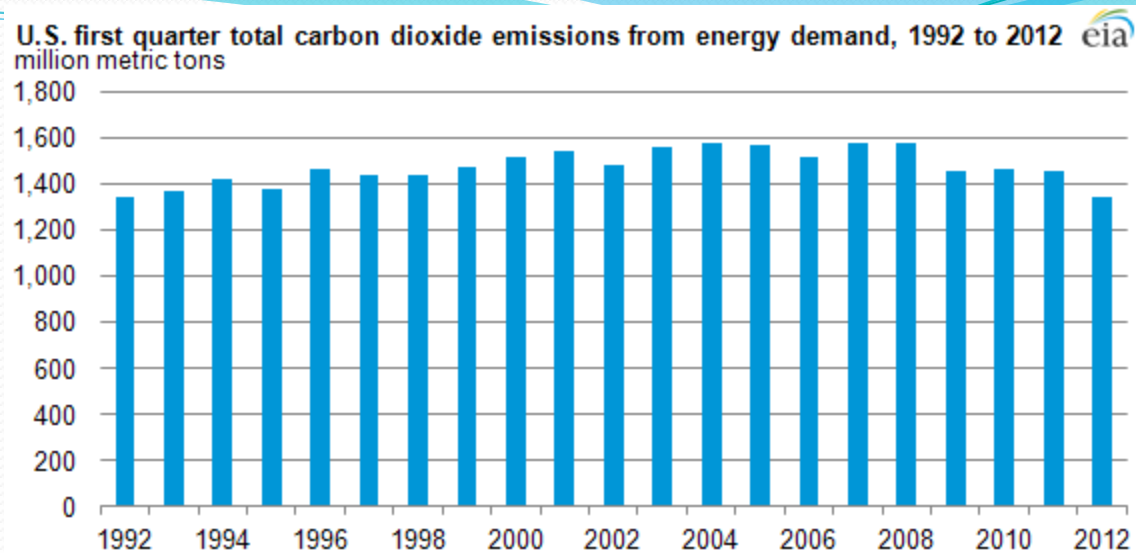
Residents and environmental groups have criticized the department for not quickly or adequately expanding the state's existing air quality monitoring network to capture changes related to increased natural gas development, especially in rural areas with little if any established air monitoring.

Three short-term studies the state performed near shale gas infrastructure in 2010 did not find any pollutants at concentrations likely to cause health impacts, but DEP could not tell from the short studies if the cumulative air emissions from all gas activities in an area would violate federal health standards.

A new yearlong study, announced Monday, will test the air near large-scale gas compressor and processing stations in southwestern Pennsylvania to determine if there are any chronic or long-term risks to the public.

The department also plans to install a new monitoring site for ozone and nitrogen oxides downwind of Marcellus Shale drilling and gas processing in Bradford County this year.

## U.S. energy-related CO<sub>2</sub> emissions in early 2012 lowest since 1992



EIA, Aug. 2012:

“U.S. carbon dioxide (CO<sub>2</sub>) emissions resulting from energy use during the first quarter of 2012 were the lowest in two decades for any January-March period. Normally, CO<sub>2</sub> emissions during the year are highest in the first quarter because of strong demand for heat produced by fossil fuels. However, CO<sub>2</sub> emissions during January-March 2012 were low due to a combination of three factors:

- A mild winter that reduced household heating demand and therefore energy use
- **A decline in coal-fired electricity generation, due largely to historically low natural gas prices**
- Reduced gasoline demand”